

### AMENDMENTS TO THE CLAIMS

The following listing of the claims replaces all previous versions of listings:

1. (currently amended) A biodetector for the detection of a selected substance comprising:
  - (a) a transmembrane fusion protein comprising an extracellular ligand-specific moiety and ~~an~~ membrane intracellular enzymatic signal transforming domain, wherein said extracellular ligand-specific moiety comprises an antibody and wherein said antibody binds said selected substance, which binding activates said intracellular enzymatic signal transforming domain, wherein the membrane intracellular enzymatic signal transforming domain is selected from the group consisting of bacterial two-component regulatory systems, eukaryotic receptor-mediated signal transducers, and prokaryotic receptor-mediated signal transducers;
  - (b) a transducer, wherein said transducer has an inactive form and an active form which are distinct from each other, and said activated intracellular enzymatic signal transforming domain converts said inactive form of said transducer into said active form of said transducer protein, wherein said transducer and said intracellular enzymatic signal transforming domain are separate proteins;
  - (c) a responsive element comprising a transcription activation element, wherein said responsive element is activated by said active form of said transducer, resulting in a detectable signal.
2. (canceled)
3. (previously presented): The biodetector of claim 1, wherein said responsive element further comprises a nucleic acid encoding one or a plurality of gene products, which gene product or gene products produce said detectable signal, and wherein said nucleic acid is operatively linked to said transcription activation element.
4. (original): The biodetector of claim 3 wherein said detectable signal is light.

5. (previously presented): The biodetector of claim 3, wherein said gene product is detectable by means selected from the group consisting of bioluminescence, colorimetric reactions or fluorescence.

6. (original): The biodetector of claim 3, wherein said nucleic acid comprises a luciferase operon.

7 to 8. (canceled)

9. (previously presented): The biodetector of claim 6, wherein said selected substance is selected from the group consisting of microorganism, virus, retrovirus, protein, sugar and ion.

10 to 20. (canceled).

21. (previously presented): The biodetector of claim 1, wherein said intracellular enzymatic signal transforming domain is a PhoQ intracellular enzymatic domain.

22. (previously presented): A genetically engineered bacterial cell comprising a biodetector according to claim 1.

23 to 24. (canceled).

25. (previously presented): The biodetector of claim 1, wherein said intracellular enzymatic signal transforming domain comprises an active domain of PhoQ.

26. (previously presented): The biodetector of claim 1, wherein said transmembrane fusion protein is a fusion of an active domain of PhoQ, and a region of a heavy chain antibody.

27. (previously presented): The biodetector of claim 5, wherein said gene product is detectable by means of bioluminescence.